

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Barry R. MATTHEWS *et al.*

Title: ANTIVIRAL LINEAR POLYMERS

Parent 09/230,189  
Appln. No.

Parent March 15, 1999  
Filing Date:

Examiner: Unassigned

Art Unit: Unassigned

**PRELIMINARY AMENDMENT**

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above application as follows:

**IN THE CLAIMS:**

Please cancel claims 1-16, without prejudice or disclaimer.

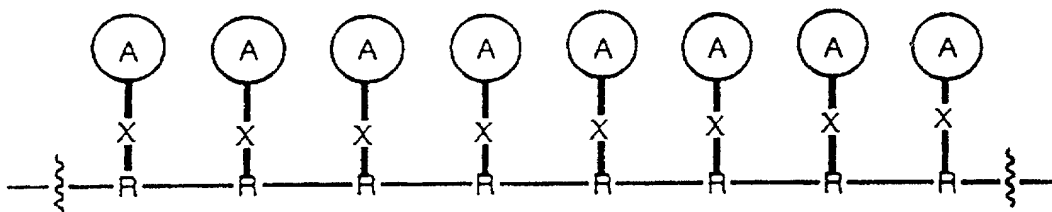
Please add the following claims:

--17. An antiviral compound comprising a linear, non-carbohydrate polymer having a plurality of side chain groups, wherein at least one of said side chain groups has an anionic- or cationic-containing moiety bonded or linked thereto, wherein said anionic-containing moiety is selected from the group consisting of

- (i) aryl or arylalkyl anionic moieties;
- (ii) heteroaryl or heteroarylalkyl anionic moieties; and
- (iii) neuraminic or sialic acid-containing moieties which are modified by substitution in the 4-position thereof;

and said cationic-containing moiety is a quaternary nitrogen-containing moiety.

18. An antiviral compound according to claim 17, comprising a linear polymer of the formula:



wherein:

R is a non-carbohydrate monomer unit forming a linear polymer backbone;

X is an optional linking group on the side chain groups of monomer units R;

and

A is an anionic-containing moiety as defined in claim 17.

19. The antiviral compound according to claim 18, wherein said linear polymer has a median range of molecular weight distribution from 1,000 to 1,000,000.

20. The antiviral compound according to claim 19, wherein said median range of molecular weight distribution is from 10,000 to 600,000.

21. The antiviral compound according to claim 18, wherein said monomer unit R is an amine moiety or an amide moiety.

22. The antiviral compound according to claim 21, wherein said monomer unit R is an amino acid.

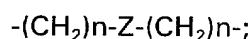
23. The antiviral compound according to claim 22, wherein said amino acid is lysine.

24. The antiviral compound according to claim 18, wherein said linking group X is a functional linking group selected from the group consisting of an ester, an amide, an ether, a thioether, an amine, an urea, a thiourea, a carbamate and a carbonate.

25. The antiviral compound according to claim 18, wherein said linking group X is a spacer group selected from the group consisting of an alkyl chain, a branched alkyl chain, an alkoxy chain, a polyalkoxy chain, an alkylthio chain, a polyalkylthio chain, an alkenyl chain, a multiple alkenyl chain, an alkynyl chain, and a multiple alkynyl chain.

26. The antiviral compound according to claim 25, wherein said linking group X is a substituted chain.

27. The antiviral compound according to claim 18, wherein said linking group X is a group of the formula:



wherein Z is selected from the group consisting of  $-\text{CH}_2-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{C}\equiv\text{C}-$ ,  $-\text{O}-$  and  $-\text{S}-$ , and wherein n is an integer of from 1 to 15.

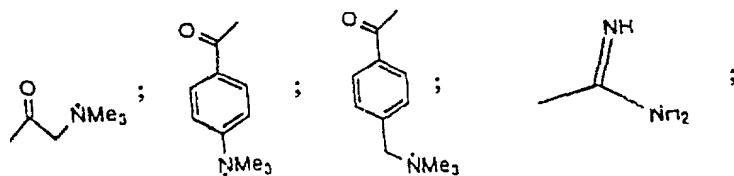
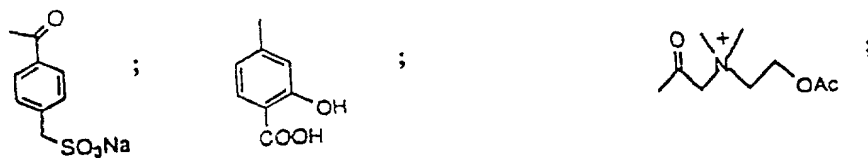
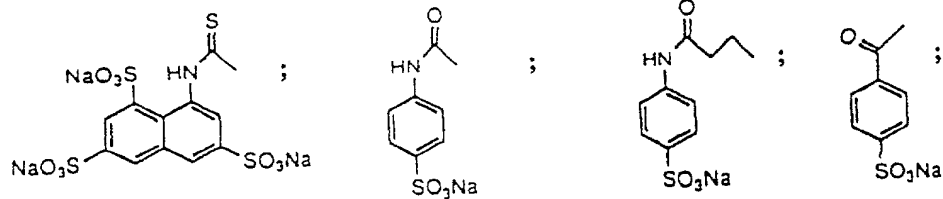
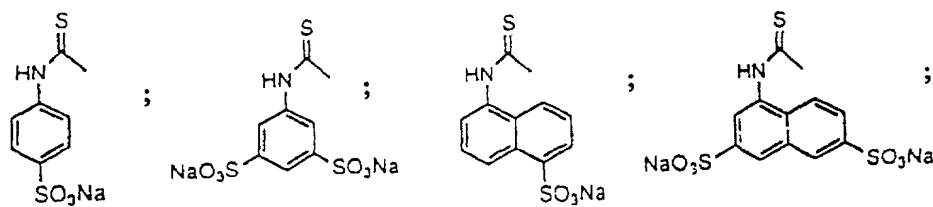
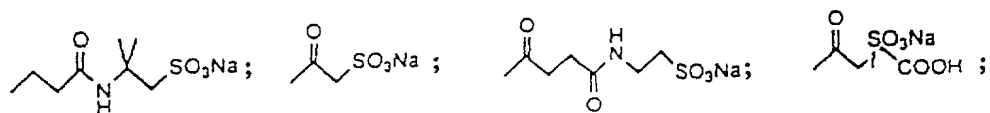
28. The antiviral compound of claim 17, wherein said anionic- or cationic-containing moiety is bonded by an amide or a thiourea linkage to a reactive functional side chain group of said linear polymer.

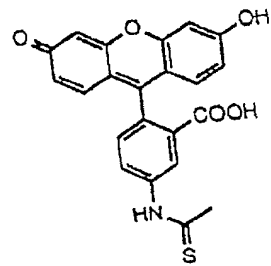
29. The antiviral compound of claim 28, wherein said reactive functional side chain group is selected from the group consisting of an amine group, a sulfonyl group, and a hydroxy group.

30. The antiviral compound according to claim 17, wherein said anionic containing moiety is selected from the group consisting of

at least one sulfonic acid containing moiety,  
at least two carboxylic acids containing moiety,  
at least one neuraminic acid containing moiety modified by substitution in  
the 4-position thereof,  
at least one sialic acid containing moiety modified by substitution in the 4-  
position thereof,  
at least one boronic acid containing moiety,  
at least one phosphoric acid containing moiety,  
at least one phosphonic acid containing moiety,  
at least one esterified phosphoric acid containing moiety, and  
at least one esterified phosphonic acid containing moiety.

31.  $-\text{Ar}(\text{SO}_3)_{n1};$   
 $-\text{ArX}^1(\text{CH}_2)_n\text{SO}_3;$   
 $-(\text{CH}_2)_n^+\text{NMe}_3;$   
 $-\text{Ar}(\text{N}^+\text{Me}_3)_{n1};$   
 $-\text{Ar}(\text{CH}_2\text{N}^+\text{Me}_3)_{n1};$   
 $-\text{ArX}^2\text{P}(=\text{O})(\text{OR})_2;$   
 $-\text{ArX}^2\text{P}(=\text{O})(\text{OR})(\text{NR}^1\text{R}^1);$   
 $-\text{Ar}[\text{P}(=\text{O})(\text{OR})_2]_{n1};$   
 $-\text{Ar}[\text{B}(\text{OH})_2]_{n1};$   
 $-\text{Ar}[\text{COOH}]_{n2};$





wherein  $X^2$  is O,  $CH_2$ , CHF, or  $CF_2$ .

32. The antiviral compound according to claim 17, wherein said compound is selected from the group consisting of:

- a 4-sulfophenylthiourea terminated poly-L-lysine,
- a 3,6-disulfonaphthylthiourea terminated poly-L-lysine,
- a 3,5-dicarboxyphenylthiourea terminated poly-L-lysine,
- a 4-(phosphonomethyl)phenylthiourea terminated poly-L-lysine,
- a 1-phosphonooxyphenyl-4-thiourea terminated poly-L-lysine, and
- a benzamido-4-boronic acid terminated poly-L-lysine.

33. A pharmaceutical composition for preventing or treating a viral infection of an animal comprising a compound of claim 17 and a pharmaceutically acceptable carrier or diluent.

34. A method for preventing or treating a viral infection of an animal comprising administering to said animal an amount of the compound of claim 17 sufficient to prevent or treat said viral infection.

35. The method according to claim 34, wherein said viral infection is caused by a virus selected from the group consisting of HIV-1, HIV-2, hepatitis B virus, hepatitis C virus, bovine viral diarrhoea virus, Japanese encephalitis virus (JEV), human influenza virus A, human influenza virus B, rhinovirus, corona virus, human parainfluenza virus, respiratory syncytial virus (RSV), varicella zoster virus VZV, human cytomegalovirus (CMV), Epstein Barr virus (EBV), human papilloma virus (HPV), adenovirus, herpes simplex virus (HSV) type 1, herpes simplex virus (HSV) type 2, measles virus, and vesicular stomatitis virus (VSV).

36. A process for making a composition useful in preventing or treating a viral infection comprising combining the compound of claim 17 with pharmaceutically acceptable carrier or diluent.--

**REMARKS**

Applicants respectfully request entry of the foregoing amendment prior to the examination on the merits of the instant application. Should the Examiner have any questions or comments regarding the pending application or this preliminary amendment, the Examiner is requested to call the undersigned.

If there are any fees due in connection with the filing of this Preliminary Amendment, please charge the fees to our Deposit Account No. 19-0741.

Respectfully submitted,

Date 15 August 2001

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